



# **THE FUTURE OF OPERATIONS AND ENERGY MANAGEMENT**

## 1.0 Overview:

SiteWatch® represents a breakthrough in Operations and Energy Management: a flexible, affordable, and fully supported monitoring and machine analytics platform<sup>1</sup> enabling sites to view equipment operation and energy-use continuously – at a level of detail your site has never seen before. SiteWatch can have an immediate impact for nearly all manufacturing, commercial, and institutional facilities.

Notably, SiteWatch is useful across multiple operational functions. Data analysis is delivered in a variety of energy units: amps, demand (kW), usage (kWh), or direct energy cost. Additionally, the system can acquire pulse signals from non-power meters to register and analyze other data streams like natural gas (therms), water (GPM), compressed air (CFM), or heating/chilled water energy (BTUs)

In real-time, you can see the operating patterns of your machinery, as well as when and how much energy is being used - or wasted - in your facility by every energy using machine. Once the data is captured, it can be analyzed and presented through a single set of intuitive and actionable reports, as well as customized deliverables available through ongoing engineering support. Managers at any level can see the operation of an entire facility with a clarity and granularity never possible...

### **And at a FRACTION of the cost of alternative available energy monitoring**

The benefits are profound and immediate:

- Predictive maintenance (PdM)
- Condition-based monitoring (CBM)
- Energy consumption and peak loads
- Machine performance and processes
- Operator behavior and efficiency
- Reducing downtime through automatic alerts
- Making investment decisions with real data, not estimates, and verifying performance

Tiny

Wireless

Self-powered

Inexpensive



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<sup>1</sup> Panoramic Power and PowerRadar are registered trademarks of Panoramic Power Ltd in the United Kingdom and United States of America

## 2.0 Ease of Installation

**SiteWatch™** uses a **new patented technology** that replaces \$1,000 energy meters with tiny wireless sensors. The sensors are clip-on/clip-off, allowing dozens or even hundreds of sensors to be deployed on circuits, panels, or machinery in less than a day.

Data collection begins immediately after SiteWatch configures the hardware with the integrated platform, allowing insights to monitored equipment starting on day one.

### Snap-On Installation



15 Minutes

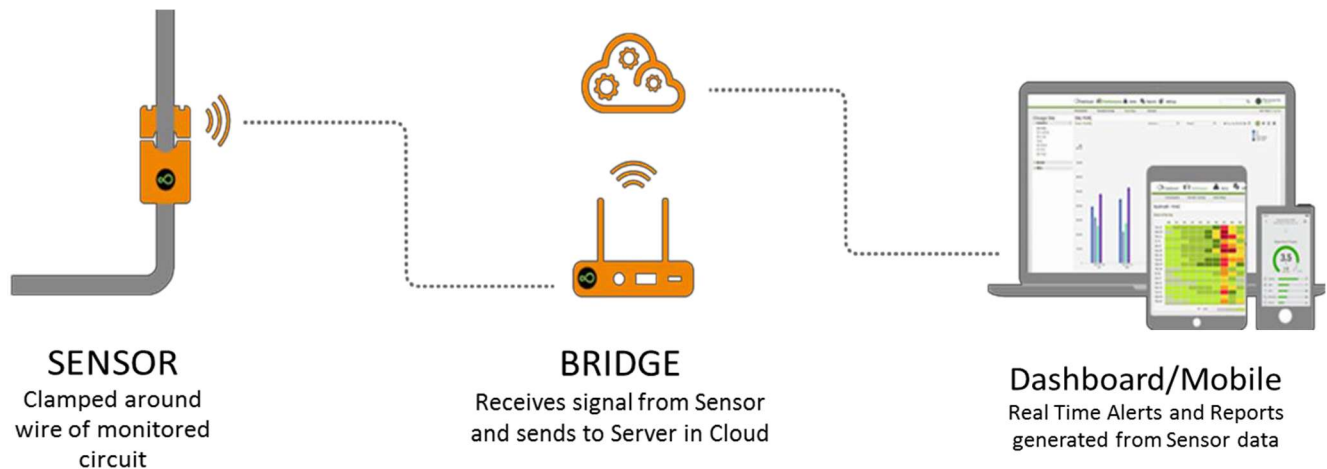
Pictured are PAN-10 and PAN-12 sensors manufactured by Centrica Business Solutions<sup>2</sup>

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### 3.0 Comprehensive Hardware and Software Integration

**SiteWatch™** features comprehensive hardware and software integration through Panoramic Power<sup>3</sup>. Sensors communicate with the cloud via Wi-Fi, wired LAN, or cellular connection. Data is consolidated on a cloud-based server, enabling detailed analysis of energy consumption without complicated onsite networking configuration and server requirements.



#### Portfolio of Sensors & Meters:



### 4.0 Ease of Use / Flexible Data Reporting

Power Radar<sup>2</sup> includes a suite of 40+ automated reports. The SiteWatch Monitoring Solutions team is available to design custom reports using advanced analytics that more specifically reflect your business and your processes. Reports and alerts are emailed directly to stakeholders, operations and maintenance personnel, or financial controllers. Whoever needs information on energy monitoring will

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find suitable, useful, actionable reporting. Users can easily:

1. Switch graphs, charts, and reports from Amps to kW to kWh to cost in dollars and cents.
2. Change views and comparison periods from 6 hours to a day, a week, a month, a year, or a specific date range.
3. Move backwards and forwards in time to compare energy consumption and changes in machine performance.
4. Use multiple graph and chart formats to identify patterns and trends.
5. Export data to a spreadsheet, or stream data to another software package.

Reports are quickly configurable:

- In the left-hand column, the user can select the equipment to be displayed. Equipment can be listed and sorted in 5 different hierarchy options.
- The upper navigation bar controls the time period.
- Results can be exported with a click of the mouse.



## 5.0 Predictive Maintenance

Predictive Maintenance is more than failure prevention. It changes a company's entire approach to machine maintenance.

- Maintenance is based on machine operating patterns, not the calendar
- Early disclosure of machine degradation permits avoidance of unplanned downtime
- Workload and vacation scheduling becomes proactive not reactive

Once you have total transparency into a motor's operating patterns, it becomes possible to identify multiple factors that can shorten machine life or signal impending problems:

- Number of start-stop instances
- Runtime hours
- Phase imbalance
- Amperage draw

### 5.1 Start/Stop Cycles

This automated Power Radar<sup>4</sup> report is emailed weekly to a user and tracks how many times each machine was started during the week.

Device	Jun 3	Jun 10	Trend
DI/RO Pump #1	3	8	 167%
DI/RO Pump #2	10	6	 -40%
Varnish Pump PRG228	209	35	 -83%

**Observations:** Accurately count number of times motor is started over time.

**Action:** Determine if a Root Cause Analysis is prudent.

1. Single phase monitoring is adequate.
2. Determine if problem is operator error, system drift, or something else

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## 5.2 Machine Hours

This automated Power Radar<sup>5</sup> report is delivered at the end of a calendar month and tracks run hours for each machine

		Jun-2019	Jul-2019	Aug-2019	Grand Total
Motor	Black Packout Mill	245.75	211.75	278.50	736.00
	Dispersion Mill	245.25	291.00	267.75	804.00
Pump	DI/RO Pump #1	349.00	361.75	334.75	1,045.50
	DI/RO Pump #2	357.25	385.00	415.25	1,157.50
	Jockey Fire Pump	699.00	744.00	744.00	2,187.00
	Process Water Pump #11	266.00	235.00	229.00	730.00
	Process Water Pump #12	256.50	228.75	200.75	686.00
	Tank Farm Pump 1	30.50	107.75	40.25	178.50
	Tank Farm Pump 2	13.50	3.25	2.50	19.25
	Tank Farm Pump 3	7.50	34.00	156.75	198.25
	Varnish Pump E	657.50	733.25	736.75	2,127.50
	Varnish Pump F	714.25	733.25	734.00	2,181.50
	Varnish Pump PRG228	551.75	739.75	742.50	2,034.00
d Total		4,393.75	4,808.50	4,882.75	14,085.00

**Observations:** Accurately measure machine “on” time.

**Action:** Optimize maintenance interval on a per machine basis.

1. Single phase monitoring is adequate.
2. Plan maintenance activity and order spare parts just in time.

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### 5.3 Trend machine power consumption over time (amps)

This automated Power Radar<sup>6</sup> report is delivered to a user weekly and compares device operating amps from month to month.

Performance Monitoring Report - Monthly							
Device	2017						Trend
	Jan	Feb	Mar	Apr	May	Jun	
Cone Crusher	344	340	344	347	351	344	0%
Dewatering Screen1	15	15	15	15	15	15	0%
Dewatering Screen2	20	19	19	19	18	19	-4%
Mains Water Pump	303	300	305	328	330	340	12%
Moisture Reduction Pump	27	27	27	27	27	27	0%
Primary Screen 1	92	91	90	91	95	95	4%
Primary Screen 2	80	80	80	79	80	79	-2%
Sand Pump1	235	237	230	233	233	241	2%
Sand Pump2	241	242	244	235	242	244	1%
Secondary Screen1	79	78	78	79	80	81	2%
Secondary Screen2	97	96	97	97	97	94	-3%
Silt Return Pump	160	160	160	169	166	169	6%

**Observations:** Identify machines that are increasingly pulling more amperage during a six month observation window. If amp increase >10% = Orange bubble.

**Action:** Service machine soon - likely that bearings or internal workings are worn and may fail.

1. Single phase monitoring is adequate.
2. Conduct Root cause analysis if criticality dictates.

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## 5.4 Detect Phase Imbalance

This automated Power Radar<sup>7</sup> report illustrates % of time that a machine exhibits phase imbalance and highlights (red) cases where calculated imbalance exceeds 20%

<b>centrica</b> Business Solutions   INX International > INX Intl Dunkirk > Weekly Report for the Week Starting at 2019-08-31							
<b>Unbalanced 3-Phases Devices</b>							
Phase BLC2							
	August 31	1	2	September			
Device	Saturday	Sunday	Monday	3 Tuesday	4 Wednesday	5 Thursday	6 Friday
Black Packout Mill				0.0%	0.0%	0.0%	0.0%
Dispersion Mill				27.3%	50.0%	36.4%	10.5%
Tank Farm Pump 1				0.0%	22.2%	30.0%	100.0%
Tank Farm Pump 3				0.0%	0.0%	30.0%	57.1%
Varnish Pump PRG228	95.8%	70.8%	83.3%	29.2%	8.3%	62.5%	100.0%

**Observations:** Devices with excessive phase imbalance will generate more heat internally, and this will shorten (motor) life

**Action:** Determine root cause and consider maintenance check-up of distribution panel

- Three phase monitoring required.
- Thermography at distribution panel may find over-amping impacting other devices, signaling need to tighten connections or review distribution infrastructure.

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## 6.0 Energy Reports

Originally created to help manufacturers identify energy conservation opportunities, PowerRadar<sup>8</sup> offers numerous energy reports and alerts that your sustainability, EH&S, plant finance, and procurement teams may find useful. These include minimizing energy use and peak power management. Contact SiteWatch to discuss additional energy cases.

- Heat Maps (see following page)
- Shift/Operator/System Benchmarking
- Daily Peak
- Sankey energy flows
- Normalized specific energy by machine, department, or device group

### 6.1 Managing Peak Demand / Scheduling

Heat Map from the Power Radar platform shows when **peak demand** occurs – i.e., dark red blocks.



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### Observations:

- Knowing when **peak demand** occurs is useful for managing your electrical “Capacity Tags” and for production scheduling.
- This two-shift operation should have little or no usage during the third shift but is showing some here (in green).
- Erratic usage patterns from week to week – see the lack of red blocks in Week2.

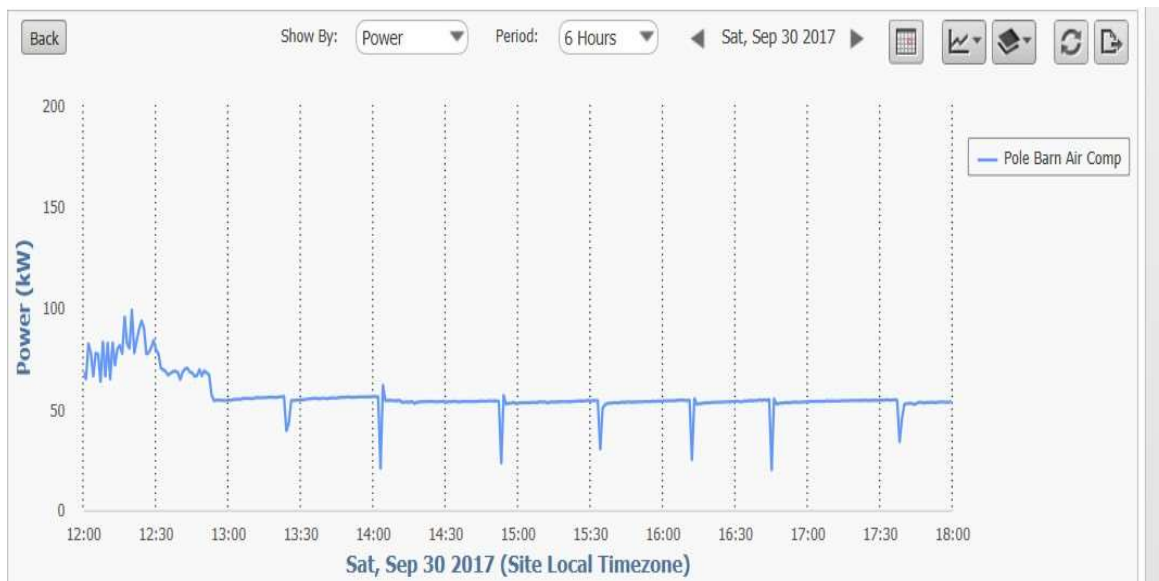
### Action:

- Install sensors to detect source of off-hours consumption.
- Revise scheduling, if possible, to reduce usage peaks during Hours with peak electricity costs.

**Customer savings potential:** \$65,000

## 6.2 Identifying Energy Waste

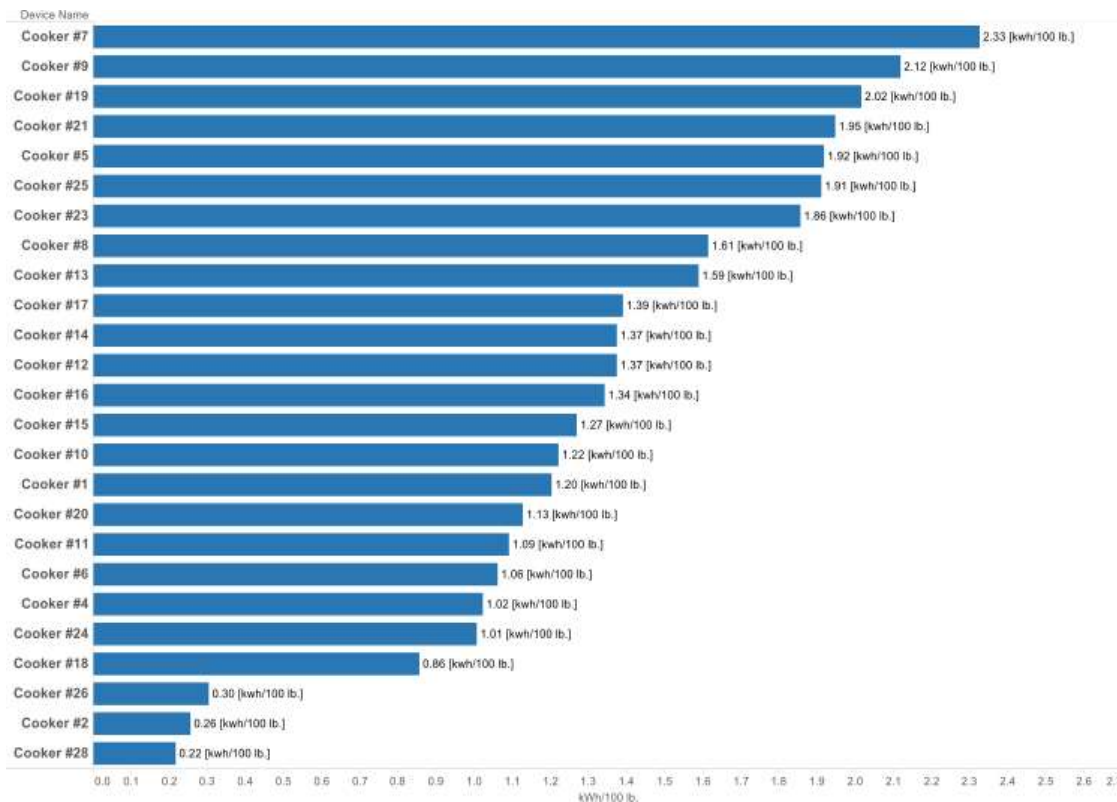
SiteWatch analytics working alongside Power Radar<sup>9</sup> provide a powerful tool for identifying wasted energy and unnecessary machine operations



- **Observations:** Compressor has plant load until 13:00, then idles for 6 hours, with occasional shut- downs when pressure in the system meets the maximum setting. The average 50kW load when the compressor has no plant-load is **the cost of keeping up with air leaks**.
- **Action:** Compare the cost of fixing the leaks with the potential savings.
- **Customer savings potential:** 438,000 kWh / Year (\$40,000)

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## 6.3 Benchmarking / M&V



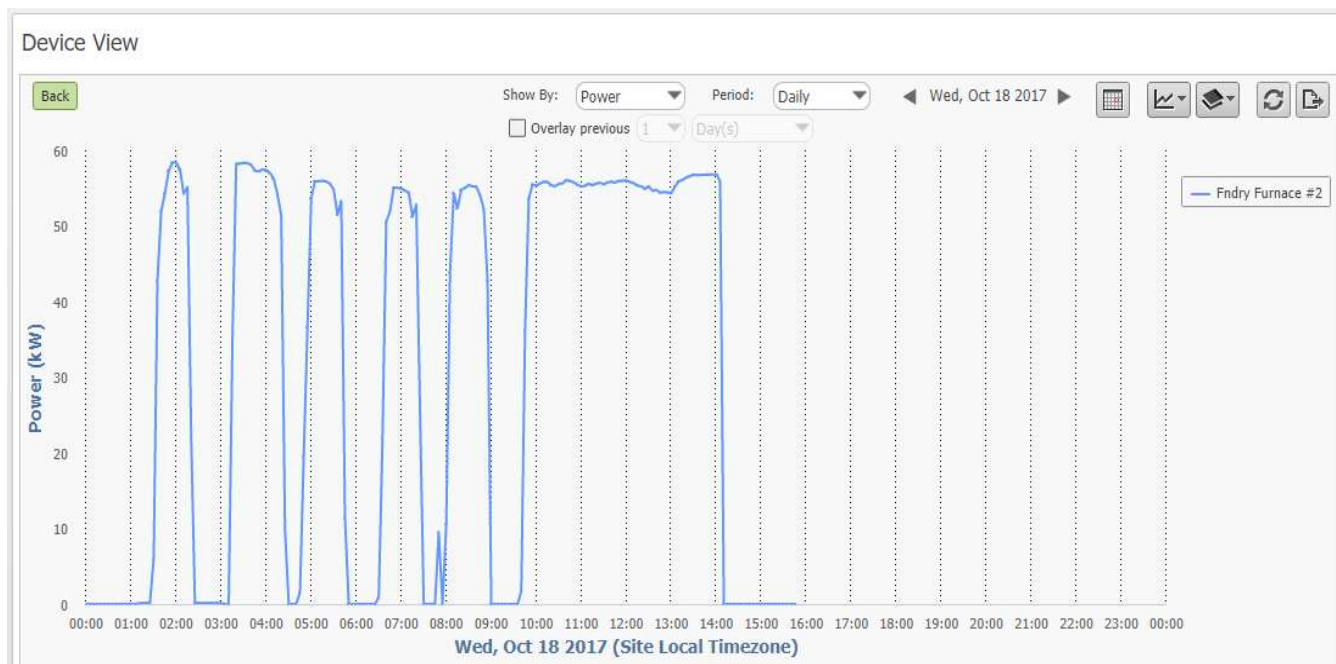
Ranking cookers according to the amount of energy required to produce 100 lb. of product

- **Observations:** This report indicates significant disparity among cookers in a food preparation facility. The least-efficient cooker uses 10x the energy of the most efficient cooker to produce the same amount of finished product.
- **Action:** Calculate savings from replacing least effective units
- **Customer savings potential:** \$172,000 per year for nine least efficient units

Importantly, this report format could also be used for **Billing** – Department/Tenant sub-billing and bill auditing.

## 6.4 Equipment Failure Alert

Erratic operation of a heating element in an oven or furnace could overheat or under-heat that oven or furnace resulting in excess energy use and/or low product quality. If an element fails, it increases the load on the other elements, which will tend to fail sooner.



- **Observation:** This furnace maintains temperature by switching on automatically every hour or so. At 11:00 it would normally shut itself off, but in fact continued running for 4 hours.
- **Action:** Investigate why it did not shut off. Did someone override it manually? Did one or more heater elements fail so it couldn't reach its operating temperature within an hour?
- **Set an alert to warn if the furnace remains at >50kW for more than 90 minutes.**

## 7.0 Pricing

SiteWatch is sold as an integrated hardware/software/support solution: monitoring as a service. The system and support are inexpensive compared to legacy energy monitoring, are cost-effective to buy and operate, and hardware requires little to no maintenance.

There are two principal components to SiteWatch pricing:

- Hardware and Installation
- Onboarding/ Software/ Data Services/ Support Services

## HARDWARE AND INSTALLATION

A typical installation to monitor 40 key machines costs *approximately \$10,000 installed*. This price includes:

Project scoping	Installation supervision
Pre-configuration of software	Onboarding
Shipping	Travel allowance

Prices will vary based on the final design, and additional charges may include:

- External CTs if required
- SIM cards and modem for cellular service if required
- Cellular data transmission charges if required
- PAN-42 meters, which are more expensive

## SOFTWARE, DATA, AND SUPPORT SERVICES

Following installation, there is a modest annual fee for the software subscription, data services, and engineering support. For monitoring 40 critical machines, this fee is *roughly the cost of two cell-phone contracts*. It includes:

Unlimited hardware warranty	Software license and firmware updates
Set up of reports and alerts	Unlimited mobile and desktop seats
Initial and ongoing training	Data acquisition and storage
Remote monitoring by our engineers	Data analysis and security
Technical and engineering consulting	45+ reports available immediately
Unlimited engineering support	Flexible custom reports and alerts

## IMMEDIATE RETURN ON INVESTMENT

SiteWatch supported energy monitoring typically pays for itself within the first 60 days. The entire hardware and first year of support cost can be recovered through:

- Saving 1 hour per day in labor costs by eliminating manual monitoring
- Eliminating 1 hour/day in unnecessary machine run-time
- A 2% reduction in energy use (typical range of results is 5%-15%)